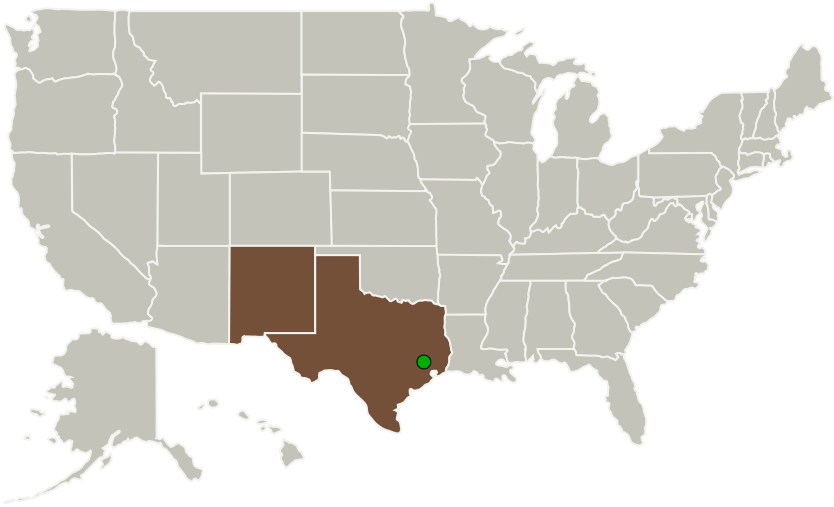
# In Situ Water Isotope Analyzer for Moon Exploration, Phase II

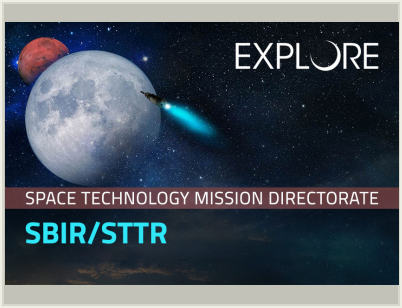
Completed Technology Project (2010 - 2013)

## Project Introduction

Studying the isotopic composition of materials is an established method to obtain detailed insight into formation and evolution processes in our Universe. Water may play a dominant role in unraveling these processes. Isotope hydrology applied in situ on the Moon and other planets might develop into the key method to understand the history of our Solar system. The Moon provides unique opportunities to study trapped volatile compounds, like water, due to the special conditions at its poles. These conditions enable the long term storage of volatiles and preservation of their isotopic composition. A compact, precise isotope hygrometer operated on the Moon will be an invaluable tool if abundant water sources are found on the Moon in the LCROSS mission. This project seeks to develop a highly sensitive, portable water isotope ratiometer for precisely measuring water samples in situ on the Moon. The optical sensors developed on this project will have unique features including fast response, high precision and strong species selectivity. Design criteria such as a small footprint, low weight, low power consumption and continuous sensor health monitoring will be implemented to optimize the sensors for application to the Moon. An absorption approach using modulation techniques will be implemented on a lunar mission suitable platform.

## Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Vista Photonics, Inc. | Lead Organization | Industry | Santa Fe, New Mexico |
| Johnson Space Center(JSC) | Supporting Organization | NASA Center | Houston, Texas |

| Primary U.S. Work Locations | |
|---|---|
| New Mexico | Texas |

## Project Transitions

**January 2010:** Project Start

**March 2013:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/139105)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Vista Photonics, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

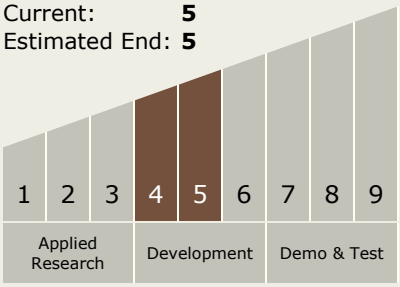
Carlos Torrez

**Principal Investigator:**

Joerg Kutzner

## Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System